Communicative Abilities in Autism: Evidence for Attentional Deficits

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Although there are many theories about autism, something all of them agree upon is that autistics are impaired in the ability to communicate. The explanation is either their incapacity to attribute mental states to others or the interference of irrelevant stimuli with the access and processing of the communication (low). Our study on mute autistic children aims to investigate their communicative ability in order to bring some new evidence on the debate. We used an experimental technique that allows autistic children to access and process the communicative acts in a familiar context for as long as needed. The experimental results show that our sample of autistic children performs as well as the control group of normal children in dealing with directs, indirects, ironies, deceits, and recoveries of failure. Independent of their respective difficulty, the felicitous outcome of any of these acts requires the capacity to attribute an adequate communicative intention to the actor. Moreover, our results show that, contrary to the established findings in the literature, autistics’ performance in the standard false belief task, a task that requires one to understand the mental states of other people, is equivalent to the performance of normal subjects. We argue that an attentional deficit affects the communicative performance of autistics in experiments where classic methodologies are used; with the proper methodology, we can access the unexplored world where mute autistic children also communicate. As far as we know, this is the first systematic experiment on pragmatic abilities in mute autistic children. Indeed, our work shows that tests and methodologies which help to focus on the communicative task improve the autistics’ performance with respect to those used in the literature. We conclude that the autistic communicative deficit is at the performance level and that it has an attentional nature.

Key Words: autism; communicative abilities; attentional deficits; theory of mind.

1. INTRODUCTION

Autism is a developmental disorder which affects a child’s entire development; from infancy on, it is characterized by symptoms which evolve with age. Kanner (1943) was the first author to name the syndrome autism and to provide a clinical description. This original description has been modified over time, although the diagnosis of autism is still based on behaviors.

Wing and Gould (1979) conducted an epidemiological survey on the autistic children of the London borough of Camberwell and defined a triad of impairments which define them. The triad consists of an impaired social functioning, deficit in imagina-
tion, and delayed or abnormal language and communication. The set of three impairments has been verified to be necessary and sufficient to define the syndrome. Actually, they are the basis of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), which is the major diagnostic instrument currently in use.

With regard to the lack of communicative ability, the range of communicative deficit in autism is striking, from the totally mute autistic child who does not even use gesture to communicate, through the echolalic child who may parrot sentences without any relation to the context, to the fluently speaking, but pragmatically bizarre, child of Asperger’s syndrome.1 In the preverbal phase, autistic children employ odd forms for expressing their intentions and, rather than use gestures, vocalization, or gaze as normal children do, they may engage in socially unacceptable behaviors such as aggression or self-abuse to protest (Donneland et al., 1984). They do not support their conversational exchanges with gestures, facial expressions, head nods, and smiles (Ricks & Wing, 1975), and they fail to respond to such cues given by others and to other’s emotive expressions (Hobson, 1986a, 1986b). Although more interactive communicative functions may develop later in those able to speak, there is no evidence about autistics who remain mute.

Concerning the verbal phase, a good deal of research focuses on speech features in autistic subjects, despite the fact that a large portion of them never develop speech. Prizant and Duchan (1981), for instance, examined the function of the immediate and delayed echolalia of autistic children in natural interactions and found various communicative functions, including request, protest, affirmation, and calling. They conclude that echolalic utterances are intentional rather than just automatic. Also, detailed linguistic analyses of the spontaneous speech showed that syntax and morphology, even if delayed, are not truly deviant in autistic children compared with those of normal controls matched on mental age (Bartolucci & Pierce, 1977).

A major limit of these older works is that they are confined to a subset of the autistic population, viz. those able to speak. Further, most of them are based on gestures, extralinguistic communication, and lexical speech or syntactic features, but not on pragmatics. However, as Tager-Flusberg (1981a, 1981b) shows, the disturbances of language in autism are more evident at the semantic and pragmatic levels. The author (1989) carried out a study on verbally autistic children, children with Down syndrome, and normal children matched for mental age. She found that the autistic children of her sample—who had some productive language and were considered high-functioning—were able to normally use syntactic strategy. She concluded that the lower level of understanding of autistic children as compared to that of normal children is due to a impairment in utilizing semantic knowledge to comprehend the sentences. Furthermore, autistics do not infer the thoughts and feelings of others to interpret the nonliteral aspects of speech, and their conversation is repetitive and stereotypical and does not involve others (Tager-Flusberg, 1993). In short, the communicative problems in autism have a pragmatic nature.

The aim of our work is to provide a general framework within which autistics’ pragmatic abilities may find a precise place. Our interest is in the analysis of the autistic communicative deficit rather than the analysis of the whole syndrome. Thus, the following sessions are devoted to a description of the main theoretical approaches which provide a cognitive explanation of autism, a critical review of the existent literature on pragmatics in autism, a synthesis of the literature on pragmatics in nor-

1 A syndrome described by Asperger (1944/1991), in which some autistic features are manifest. Asperger’s syndrome is sometimes considered to be high-functioning autism. However, argument continues as to whether Asperger’s syndrome should be considered within the autistic spectrum or as a distinct disorder.
mal children, a comparison of the performance of autistics and normal children in pragmatic tasks, the results, and the discussion. The comparison of our experimental results with the data in the literature led us to carry out a second experiment on two levels of theory of mind; the new results cast some doubts on the proper interpretation of the typical experiments described in the literature.

In particular, we conclude that the methodologies classically used to test autistics’ performance do not allow them to display their effective pragmatic abilities because the classical procedures do not allow subjects to overcome the attentional deficits. This means that autistics’ pragmatic impairment concerns the performance rather than the competence level.

THREE THEORIES ON AUTISM

In this section we discuss three of the most relevant attempts to explain autism: Theory of Mind, Central Coherence, and Executive Functions. In the Theory of Mind (ToM), Baron-Cohen, Leslie, and Frith (1985) claim that autistics lack the ability to attribute mental states to others. According to this approach, people explain and predict the others’ behavior in terms of mental states such as beliefs, desires, intentions, and emotions. A cognitive mechanism allows us to represent the others’ mental states or to metarepresent (Leslie, 1991). Baron-Cohen and colleagues hypothesize that autistic children fail to employ the theory of mind mechanism and thus they are unable to attribute beliefs to other people. From this perspective, the pragmatic deficit of autistic children can also be interpreted in terms of a theory of mind impairment. The major evidence in favor of the ToM hypothesis is that autistic children perform significantly worse than controls in the false belief task. The use of this task springs from an observation of Daniel Dennett (1978). He pointed out that only understanding and predicting a character’s behavior based on a false belief could show theory of mind conclusively, since otherwise the real state of affairs (or the subject’s own convictions) could be appealed to without the need to postulate mental states at all. Further evidence is that autistic children are poor in dealing with tasks involving beliefs that do not correspond to reality, such as deception tasks (Sodian & Frith, 1992) and production of spontaneous pretend play (Baron-Cohen, 1987).

One flaw in an explanation offered in terms of a deficit in the theory of mind is that a substantial minority of autistic subjects do pass the false belief tests or related tests, such as perspective taking tasks (see Volden, Mulcahy, & Holdgrafer, 1997). Baron-Cohen (1989) Frith (1989), and Happé (1994) reply that, in these subjects, there is a developmental delay rather than a lack of theory of mind. Thus, they predict that this minority of autistics would fail more sophisticated theory of mind tasks. As an alternative explanation, they suggest that these subjects hack out a solution or look for alternative strategies to handle theory of mind tasks.

A second theory has been advanced by Frith and Happé (1994). They claim that autism is a cognitive disorder characterized by deficient information processing. In particular, autistics would be unable to construct meanings by making use of a whole set of contextual information. Thus, the theory predicts an impairment in the ability to use language appropriately in context. Frith (1989) refers to the normal processing of information as Central Coherence, a concept very similar to the functioning of memory according to Bartlett (1932): From the very beginning of a narration individuals tend to eliminate details to concentrate on the meaningful elements of the story, which are then memorized. Sensitivity to the context eliminates any ambiguity, giving relevance to the meaningful information, which results in a whole, i.e., central, coherence. The extraordinary ability of autistic children in perceptive tasks is seen by Frith
as a lack of attention to the context as a whole; information is successfully processed at local levels, but not globally. In this regard, Happé (1991) carried out an experiment on homographs. With these words the only way to disambiguate the meaning of stimuli is to find the correct pronunciation by looking at the context. Happé showed that this task is more difficult for autistic children than for dyslexic or normal children of comparable reading level. Indeed, autistic children tend to pronounce words according to their more common meaning.

Although the theory of Central Coherence provides an explanation for the local processing style typical of autistic children, it is still controvertial. Ozonoff et al. (1994), for instance, failed to find evidence of a local processing advantage on perceptual tasks in high-functioning autistic individuals: They suggest that this discrepant finding can be solved if it is accepted that Frith’s theory concerns conceptual rather than perceptual processing characteristics. The difficulty is that it is not clear whether the weak central coherence hypothesized in autism is universal or specific or how it is related to different symptoms. For instance, it might be better described as an additional impairment that affects some autistic individuals. Moreover, it is possible that weakness of central coherence refers to a number of different processes, such as attentional or perceptual impairment in low-level tasks (e.g., the embedded figures) and higher level impairment in other tasks (e.g., homograph tasks).

The findings by Ozonoff et al. (1991, 1994) suggest that a deficit at the executive function level might be central to autism. Executive Function is a concept borrowed from Luria (1966) and developed by Norman and Shallice (1980); it is a cognitive construct which is used to describe the goal-directed behaviors mediated by the frontal lobes. The executive function allows disengagement from the immediate environment and guides action by internal representations (planning, inhibition of prepotent responses, flexibility, and working memory). To assess executive function, Ozonoff and colleagues used two tasks: the Wisconsin Card Sorting Test, which measures flexible category shifting, and the Tower of Hanoi, a test of planning and monitoring. In both tests autistic children are less efficient and more perseverative than the control group. Thus, the authors conclude that executive function is the best predictor of autism and that executive dysfunction is primary with respect to a defcit of the theory of mind. Consistently with the proposal by Ozonoff and colleagues, the so-called neurobehavioral theories of autism claim that this is characterized by a general impairment in the control mechanisms of attention (such as executive functions), sensory, and perceptual abilities (Minshew, Goldstein, & Siegel, 1997; Pierce, Glad, & Schreibman, 1997).

However, the Executive Function explanation is too broad, because its level of analysis applies to many disorders. For instance, it might simply be a marker for frontal pathology. Moreover, although such a theory is a good attempt to explain the deficient autistic performance in a variety of tasks in terms of attentional problems, Executive Function by itself cannot explain social and communicative impairments.

Other theories claim that an attentional deficit would impair the ability to represent relevant items of information together, thus compromising the communicative ability. The focus of these theories shifts from a competence level—the communicative impairment is due to a high cognitive capacity deficit—to a performance level, which provides both peripherical and localized explanations of the deficit. Gerrans (1998) makes a clear example of how an attentional deficit could affect some cognitive capacities: “Imagine that the development of attention depended on the release of a protein at a specific age of development, and imagine that that protein was never released, then all the cognitive skills which depend on working memory would be affected. The behavioral outcome would be a disturbance to a wide range of central capacities—like communication—with some isolated skills left unaffected.”
There has been much qualitative and quantitative research on pragmatics in autism. However, as Bara, Bosco, and Bucciarelli (1999) note in their review, none has been systematic: Each study deals with a single pragmatic phenomenon, and it fails to provide a general framework for understanding communicative abilities in autism. Here, we shall sketch the most representative works of both the qualitative and the quantitative sort.

Within the qualitative approach, the autistic communicative deficit has been ascribed to the pragmatic domain (see, e.g., Prizant, 1983), and the focus of the studies is the autistic use of language in context. A general feature of these studies on pragmatics is the stress on the emotional relevance of maintaining a self-confident setting for autistic children under observation. Since the use of unfamiliar experimental situations may distort the profile of communicative behaviors displayed by the autistic child, researchers frequently use natural observations to assess communicative abilities and impairments in unstructured interactions. Loveland and Tunali (1993), for example, observe autistic children while they are playing a game they are able to play. In the attempt to explain the game to someone, authors find that the autistics offer limited information concerning the game and conclude that autistics are deficient at the pragmatic level and lack understanding of the listener’s representational and affective state.

In line with this ethological investigation on verbal autistic children, Wetherby and Prutting (1984) analyze the range of their speech acts. To have a measure of how autistic children use spontaneous communication through gestural, vocal, or verbal means, they videotaped four normal children and four autistic children (matched for language development) during both a free-play condition and one designed to communicate. The results suggest that autistic subjects have a more limited repertoire of communicative functions than normal children. The quality of the communicative acts is also different: The autistics used a higher portion of acts to obtain something, while there was a complete absence of speech acts used for requests of information, for acknowledgments of others, for showing off, and for commenting.

A similar example of natural observation is the study by Loveland et al. (1988). They videotaped free-play sessions of children and parents together to measure the use of communicative acts by parent and child. They found that the autistic group, compared with developmentally language-delayed children and with normally developing children, used fewer communicative acts (both verbal and gestural). Moreover, the higher percentage of acts were used for instrumental reasons (e.g., to continue the interaction). Autistic children initiated communication less frequently than the other groups, thus inducing their parents to play a more active role with them.

At the same time, the need of quantitative data concerning the pragmatic abilities of autistic children has given rise to some interesting studies. But, alas, quantitative research often has forgotten the ethological aspects, whose relevance had been made clear in early observations. In particular, the ethological approach has revealed that autistic children have an emotional fragility that may be ignored in the quantitative experimental setting.

As for the quantitative approach, Paul and Cohen (1984) compared the abilities of verbal autistic, nonautistic, and mentally retarded subjects (IQ-matched). They were engaged in conversations into which examiners injected three types of contingent query requests. The three groups performed similarly in a context where the request intent of the utterance was made explicit. The autistic subjects, however, did significantly worst when the same request was presented in an unstructured context and without making the intention of the utterance explicit.
Several other studies on autistic children focus on narrative language, i.e., the ability to build and organize a story by a speaker or a writer. Tager-Flusberg and Quill (1987) asked autistic, mentally retarded, and normal children, matched on verbal mental age, to narrate a story based on pictures from a wordless picture book. The autistic group produced shorter and less complex stories and were less likely to include any causal statements to explain the relationship between events in the stories (Tager-Flusberg, 1995a). In a related work, students (autistic, mentally retarded, and normally developing children) were asked what they thought the feeling of some of the characters in the story were. Autistic and mentally retarded children gave fewer appropriate emotional responses and the autistic had difficulty in explaining emotional states correctly (Tager-Flusberg, 1995b).

Loveland et al. (1990) analyzed the pragmatic aspects of story retelling and found that autistics differ from Down syndrome children in that they produce considerably bizarre and irrelevant speech and uninformative gestures. Bruner and Feldman (1993) report that autistics are able to take turns and respond in a conversational context, but they are unable to extend the conversation by adding new, relevant information to previous comments. They conclude that the lack of narrative language reveals not only a weakness in interpersonal understanding, but also an incomplete sharing of the social and cultural framework in which the narration evolves.

A central question in studying autistic children is whether they fail in communicative tasks because they do not refer communicative acts to the cognitive mental states involved. In this regard, many studies trace the communicative deficit of autistic children back to a more general deficit. Tager-Flusberg and Anderson (1991), for example, studied discourse development in autistic, normal, and Down syndrome children over the course of a year and found that in the early stages of language development autistic children do not differ in their turn-taking ability in contingent topic-related discourse. However, as they grow, autistic children do not show the normal increase in the use of contingent speech, nor do they show the normal increase in the use of expansion or other models of discourse which add new information to the conversation. Tager-Flusberg and Anderson interpret this impairment as stemming from absence of knowledge states. Development of the capacity to represent mental states is, in their view, related to the development of a theory of mind. Consistently, Tager-Flusberg (1992) found that autistic children just developing language use fewer cognitive state terms in spontaneous communication than Down syndrome subjects, whereas they do not differ in their use of desire, perception, or emotion terms. The paucity of joint attention interactions in young autistic children, their difficulty with language form such as the personal pronouns I and you (Bartak et al., 1975; Tager-Flusberg, 1993), and their limited reference to the psychological states (Shatz et al., 1983) have induced some researchers to link the communicative difficulty of these children to a theory of mind deficit.

Within the framework provided by the Theory of Mind hypothesis, Happé analyzed the link between communicative and theory of mind deficits. She followed the assumptions of Relevance Theory, according to which communication exploits the well-known ability of humans to attribute intentions to each other (Sperber & Wilson, 1986). Relevance theory, in her view, allows precise predictions about the levels of communicative competence that should be possible in the absence of theory of mind ability. She carried out two experiments: the first is concerned with the understanding of smile and metaphor in autistics ages 9–28 years, and the second with the under-

2 They classified a contingent utterance as one that follows immediately after an adult utterance, but does not relate to the adult topic.
standing of metaphor and irony in autistics ages 9–26 years and 14 controls with mild learning disabilities. The predictions concerning the degree of theory of mind necessary to understand smile, metaphor and irony were confirmed. Happé concluded that whatever distinguishes autistics from controls and mild learning disabilities subjects has a direct and particular association with the comprehension of figurative language.

Happe (1994) found a strong relation between the autistics’ performance in story comprehension tasks and their performance in theory of mind tasks. The control stories involved the understanding of physical events to assess the subjects’ general level of comprehension, whereas the ‘‘strange’’ stories were about everyday situations where people say things they do not mean literally. In particular, they are concerned with the different motivations that can lie behind everyday utterances that are not literally true: lie, white lie, joke, pretence, misunderstanding, persuasion, appearance/reality, figure of speech, sarcasm, forget, double bluff, and contrary emotions. The results show a correlation between the level of failures in classic theory of mind tasks and the score in the ‘‘strange’’ stories. She concluded that autistic children do not fail to use mental state terms, as is often suggested in the literature, but they fail to use appropriate mental state terms in response to nonliteral interpretations.

Surian and Baron-Cohen (1996) investigated the sensitivity of some high-functioning autistic children to the violations of Grice’s conversational maxims of Quantity, Quality, Relation, and Manner (Grice, 1975). According to the authors, if autistic children are unable to ascribe intentions, then they should fail to recognize when the maxims are being violated. This prediction was tested by comparing autistic children with both a group of normal children and a group of children with specific language impairment matched for mental age. The children were invited to identify utterances that violated the conversational maxims. The experimental results confirm the predictions: the ability to solve pragmatic tasks correlates with the ability to solve false belief tasks, and autistic children are poorer than the other groups of participants in the pragmatic tasks.

The experimental modality used in quantitative research appears to play an important role. It could be that in classic experimental settings autistic subjects do not exploit the abilities (e.g., the ability to attribute mental states to others) which they show in spontaneous interaction. Our study is quantitative in that we use the experimental methodology. However, we bear in mind the evidence acquired through the ethological studies reported above. Their most outstanding result is the role of emotions in autistics’ behavior; our experimental technique takes into account the importance of maintaining the children in a quiet, familiar environment to avoid dramatic distresses that disrupt compliance. Furthermore, the technique adopted allows us to test mute autistic children. An interesting feature of such children is that, although their performance in the classical communicative tasks is dramatically poor, they are able to communicatively interact with their caregivers at some level. The question is: How might they perform at an acceptable level if they lacked communicative competence?

COMMUNICATIVE COMPETENCE IN NORMAL CHILDREN

Normal children do not begin speaking until the second year of life; however, they do exhibit communicative behaviors much earlier than the first appearance of linguistic competence. From birth they show preference to seeing human faces and they are able to imitate facial expressions (Meltzoff & Moore, 1977). Moreover, extra
linguistic communication appears as early as the first year of life, although it is limited to the request of objects and to the call for attention to objects. The corresponding intentions are initially expressed through gestures such as reaching and pushing away, while later the gestures are accompanied by vocalizations and pointing gestures.

Dore (1975) and Trevarthen (1979) analyzed the biological predisposition of the communicative intentions and the ability to interpret the communicative intentions of an agent. Along the same lines, other authors have focused on the innate components of the ability to communicate. Bosco and Tirassa (1998), for example, identify in the shared beliefs and the communicative intentions the primitive and innate structures of the infant cognitive architecture; they claim that communication builds on the common background that the infant shares with its caregivers.

Other researchers have analyzed the different steps of the emergence of linguistic competence. Bloom and Lahey have observed a rapid increase in both receptive and expressive vocabulary in infants during the 12- to 18-month period (Bloom, 1974; Bloom & Lahey, 1978). At this time, children learn both to name the objects and to encode the relations among objects. Toward the middle of the second year, in fact, children begin combining words to form two-word sentences which still elicit a limited number of meanings; however, children already appear to understand everything their parents say. They achieve this by employing a variety of extralinguistic strategies; one of these is to look at what their parent is looking at.

Bruner (1983), in his investigation on the natural context of language development, notes that few words associated with routine games are a fundamental step in learning and understanding the first linguistic input. A familiar context (format) elicits spontaneous communicative actions and gives the child an interactional structure to learn the use of the language. From this primordial communicative framework children evolve in the understanding of more and more complex social interactions, and they employ even more complex strategies to catch the intentions behind the linguistic exchange.

Airenti (1998) claims that it is through the construction of the first behavior game (see below) that the child proceeds from infant interactions to protoconversations to finally reach a level of sophisticated communication at adolescence. In particular, the child follows the tenets of Cognitive Pragmatics, a theory concerned with the analysis of the mental states involved in comprehending and generating communicative acts (Airenti, Bara, & Colombetti, 1993a, 1993b). Communication is considered the result of the interaction between the participants and their reciprocal beliefs, intentions, and mental states. From this point of view, the goal of any communication is to have the desired effect on the interlocutor by changing his or her mental states and, possibly, to induce him or her to perform a specific action.

According to Cognitive Pragmatics, the meaning of a communicative act (linguistic or extralinguistic or, more often, a mixture of the two) is fully understood only when it is clear what move of the behavior game is being played; a game provides a context for the assignment of meaning to a communicative action. Thus, speech acts are moves of behavior games; conversely, each move of a behavior game has a communicative value and can, therefore, be considered a speech act. Consider, for instance, the following linguistic exchange:

(1) A lady enters a taxi
Lady: “To the train station, please.”
Taxi-driver: “Yes, madam.”

The taxi-driver can understand the meaning of the lady’s utterance within the context provided by the behavior game outlined as follows:
In line with the assumptions of Cognitive Pragmatics, Bara and Bucciarelli (1998) identify two main factors that account for the difference in difficulty among different pragmatic tasks: the complexity of the mental representations involved and the types of rules of inference (either standard or nonstandard) involved in reconstructing the meaning of the utterance. They predict that standard pragmatic tasks are easier than nonstandard ones: standard comprehension and production, which are concerned with directs and indirects, involve the use of default rules of inference, i.e., rules which are always valid unless their consequent is explicitly denied (cf. Reiter, 1980). Nonstandard comprehension and production, which are concerned with ironies and deceits, involve the block of default rules and the occurrence of more complex inferential processes. Bara and Bucciarelli also predict the following trend of difficulty among speech acts, ranging from the easiest to the most difficult: simple speech acts (directs and conventional indirects), complex speech acts (nonconventional indirects), ironies, and deceits. As the abilities of children both to construct complex representations and to draw nonstandard inferences increase with age, their ability to deal with the most complex pragmatic tasks should also increase. Bara and Bucciarelli carried out an experiment on normally developing children, from 2 to 7 years old, which confirms their predictions. Bara, Bucciarelli, and Geminiani (2000) obtained equivalent results in extralinguistic tasks with a sample of 80 children ranging in age from 2 to 7 years.

Following the tenets of Cognitive Pragmatics theory, we aim at investigating the ability of autistic children to deal with pragmatic tasks. Do autistic children perform as well as normal children in pragmatic tasks? And does the emergence of pragmatic competence in autism follow the same path as that in normal children? If yes, standard communication should be easier to deal with than nonstandard communication, and the trend of difficulty among speech acts should be the same for autistic and normal children.

A critical assumption in pragmatics is that the comprehension of an utterance involves the attribution of mental states to a partner in the communicative interaction. Similar attributions are required by the theory of mind and, thus, our further aim is to explore the relation between pragmatic and theory of mind tasks in autism. Finally, we attempt to explain possible pragmatic deficits in autistic children by tying them to a deficit either in the theory of mind or in the attentional capacity.

AN EXPERIMENT ON PRAGMATIC ABILITY IN MUTE AUTISTIC CHILDREN

Most of the theories mentioned in session 2 trace the causes of autism back to the absence or malfunction of some central capacities. We define them as competence theories in that they do not foresee a discrepancy between the potentiality of the autistic subjects and their abilities as detected through the experimental tasks. The hypothesis of our experiment is that the autistics’ communicative deficit is at the performance level and, presumably, is attentional in nature. In particular, we claim that the difficulty in processing the stimuli of the environment damages the emergence of the communicative abilities, the theory of mind capacities, the central coher-
ence processing, and also—at the emotional level—the fundamental relationships with the caregivers.

Our starting points are the experimental results concerning pragmatics in normal children—compared with those of autistic children—under the theoretical assumptions of Cognitive Pragmatics theory. From a methodological perspective, we follow the path traced by Koegel, Koegel, and Smith (1997). They claim that autistic children have severe difficulty in becoming involved in standardized tests, and they provide testing procedures in order to improve motivation and attention in autistic subjects. They demonstrate that autistic children, when tested in experimental tasks, obtain higher scores with motivational and attentional support than in standard conditions. Their conclusion is that in standard conditions we assess motivation and attention rather than language or intelligence.

In line with Koegel and colleagues, our aim was to set up an experimental setting which could compensate for our subjects' attentional impairment and provide us with a measure of their communicative abilities. We have adopted an experimental methodology that holds for different children. The basic idea of Koegel et al. is maintained, but we turn a personalized procedure into a standardized one. The methodology we use reduces both the attentional load involved in processing the communicative stimuli, and the emotional difficulty involved in the classic experimental settings. As we allow mute autistic children to express their communicative competence, we expect to detect better performances than those revealed by the experiments in the literature. The same assumptions should be valid for the theory of mind; when the attentional deficit is counterbalanced, we expect a good performance by the autistic children in the theory of mind tasks.

The experimental hypotheses are tested through a technique called facilitated communication (FC). Our expectation is that this method could reveal a level of pragmatic competence never obtained by previous studies. In fact, FC abolishes the difficulties posited at the attentional level (the experimental tasks are presented through a written text that can be accessed and processed by the children for as long as they need), and those posited at the language production level (the child produces a written response). Furthermore, we believe we have overcome two of the many impairments autistic subjects are faced with: emotional distress and difficulties in establishing interpersonal contacts. In fact, the presence of the facilitator (a familiar figure) has not only given them greater emotional stability to enable them to better concentrate on the task, but also provided us with a means of reaching otherwise mute autistic children.

The empirical success obtained by FC per se might be interpreted in favor of a communicative deficit in autism at the performance level. The method has allowed many autistic children—some of which are mute—to learn to communicate using a keyboard. This technique, invented by Biklen (1990, 1991) and improved by Crossley (1997), consists of a person (the facilitator) giving both physical and psychological support to the child while s/he is writing. The facilitators establish and give the rhythm to the children's arm movements. Indeed, one of the major problem in autism is the perseveration and lack of precision in movements. Lack of eye/hand coordination, weak or excessive muscle tone, and apraxia are just some of the physical problems that make written communication difficult without the help of a facilitator.

During the training, the support initially starts from the child's wrist and is gradually moved to the elbow and shoulder until such a touch becomes merely symbolic, and the facilitator's hand lightly rests on the child's leg: No autistic child has ever reached complete autonomy. Facilitators, then, do not merely enable motor functioning; they also provide psychological support. In many cases the facilitator is a member of the family. In any case, they usually form a unique and special bond with the
child. This emotional attachment is proved by the difficulty of autistic children to generalize their confidence in their FC to new persons.

The use of an FC in experimental settings has given rise to controversy because the facilitator provides physical support to the child (see, e.g., Dayan & Minnes, 1995; Duchan, 1995). On the one hand, some critics deny the validity of FC because participants seem to be unable to produce the correct responses when the facilitator is not aware of the experimental stimulus or when the stimulus is different for the participant and the facilitator (Simpson & Myles, 1995; Vazques, 1995; Wheeler et al., 1993). On the other hand, other authors claim that the research denying the validity of the FC is equally questionable (see, e.g., Silliman, 1995). It must be noted that the experiments in question tested samples of autistic children using FC with the support at the hand or the wrist. Therefore, it is plausible that the facilitator influenced their answers. We avoided involvement in this controversy by selecting only subjects that showed a good level of autonomy in using FC. Since they only needed support at the shoulder or the thigh, we are able to exclude the possibility that the facilitator affected their answers.

Using this methodology, our first experiment aims to discover whether the autistic group of participants performs as well as the control group in pragmatic tasks. Also, the experiment tests the predictions derived by Cognitive Pragmatics theory: Pragmatic tasks involving standard communication are easier than those involving non-standard communication, and simple speech acts (directs and conventional indirects) are easier than complex speech acts (nonconventional indirects), which in turn are easier than ironies, which in turn are easier than deceits. A prediction which is trivial in normal subjects is that tasks presented in the wild are easier than analog tasks presented through stories. However, we think that it is interesting to see also whether autistic children find it easier to deal with tasks within which they are more personally involved.

A related goal is to investigate the ability of autistic children to deal with theory of mind tasks presented through FC. Again, if problems in theory of mind tasks are due to an attentional deficit, then the modality of presentation ought to influence the children’s performance. With the same aim, we also investigate the ability of autistic children to deal with cognitive tasks, including attentional tasks.

Finally, we were interested in examining correlations between pragmatic and theory of mind tasks. There is evidence in the literature for a tight correlation between the ability to recover communicative failures and the theory of mind (Feldman & Kalmar, 1996); thus we included tasks involving the ability to recover communicative failures.

Methods

Participants

Twenty mute male children diagnosed with autism (DSM-IV) participated in the experiment. The ages of the children ranged from 7 to 18 years (mean age: 11 years). In fact, they were selected on the basis of their ability to use FC, which is usually introduced in primary school. In particular, they were able to communicate with their facilitator if touched on the shoulder or the thigh. Indeed, although the facilitator was blind with respect to the aim of the research, we excluded from the experiment children who needed physical support at the wrist to eliminate the possibility that the facilitator vitiated the responses. The children showed good comprehension of written language (mean score in Bada’s test = 43) and good nonverbal reasoning capacities (mean score in Raven’s Coloured Matrices = 31).

The control group consisted of children matched to the autistics for sex and chronological age (all males, ranging in age from 7 to 18 years, mean age: 11 years). Moreover, they were matched for written
Material and Procedures

The experiment was carried out individually in a quiet room in the presence of both the facilitator and the experimenter. In a session preceding the experiment each child was given the Bada test and the Raven’s Coloured Matrices. The Bada test consists of 33 sentences, each presented with two pictures; the participant selects the picture consistent with the sentence. Raven’s Coloured Matrices consists of 36 matrices, each incomplete; the participant selects among six cards the one that would complete the matrix.

The proper experiment consisted of two sessions: in the first session the participants dealt with the cognitive tests and in the second session (15 days after the first) with the pragmatic and the theory of mind tasks. For children unable to keep their attention on the tasks long enough, the presentation of the pragmatic tasks required two sessions. All the experimental sessions were videotaped.

None of the experimental sessions required the participant to produce verbal answers. Further, with regard to the pragmatic and theory of mind tasks, each was presented as written text (either on a computer screen or a sheet of paper). The facilitator either changed the computer screen or turned over the sheet of paper to present each task, thus always keeping the child’s attention on the task. There was no other verbal interaction during the experiment, except these reminders.

Cognitive Tests. The cognitive tests consisted of two series of subtests of the Leither Scale. One series is from the Reasoning and Visualization subtests, and the other from the Attention and Memory subtests. Each series consists of four subtests, thus providing measures for abstract reasoning (Sequential order, Pattern repetition, Pictures in context, and Classification) and forward and backward memory and attention (Associated pairs, Forward and Backward memory, and Visual coding). The scale does not require the production of verbal answers in that, in each subtest, the participant is invited to consider a sequence of pictures in order to complete it with one of a series of cards.

Pragmatic tasks and theory of mind tasks. Participants are randomly presented with 27 tasks (see Appendix 1). The tasks concerning the same pragmatic phenomenon, such as the theory of mind tasks, never occur on consecutive trials. The tasks are written and presented on a computer screen or a sheet of paper. The majority are short stories covering simple speech acts (three directs and three conventional indirects), complex speech acts (three nonconventional indirects), ironies (three), deceits (three), and recoveries of failed speech acts (three). Further, three tasks are first-order theory of mind tasks, i.e., false belief tasks. The remaining six tasks are simple speech acts (directs and conventional indirects) presented in the wild; they consist of written questions addressed to the participant.

The tasks are introduced with written instructions whereby the participant is invited to read the stories carefully and to answer the question that follows each story. In particular, the main question is: “Why does the actor say that?” An example is presented as a warm-up. Since all the participants understood the requirements of the tasks (as revealed by the warm up), they all moved on to the real experiment.

The answers of the participants to the pragmatic tasks were evaluated by two independent judges; they were unaware of the aim of the experiment. The judges were invited to follow a precise criterion in their evaluations: they had to evaluate whether the participant had understood the communicative intention of an agent involved in each communicative exchange. A different criterion was necessary to evaluate the performance in the deception tasks: the judges had to evaluate whether the participant had understood the private intention of the agent acting the deceit.

Results

Cognitive Tasks

Table 1 shows the mean scores obtained by the autistics and the controls in the Reasoning and Visualization tasks. The performance of the autistics in the Reasoning and Visualization tasks is significantly worse than the performance of the controls (Mann–Whitney: $z = -2.935; p < .004$). However, the overall difference is due to

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3 The Leither International Performance Scale is a nonverbal mental age scale for children 3 to 18 years old. It consists of 10 subtests measuring attention and memory and 10 subtests measuring visual coding and reasoning. The scale does not make use of verbal inputs, including the instructions for the participants.
TABLE 1
Mean Scores Obtained by Autistics and Controls in the Cognitive Tasks of Reasoning and Visualization

<table>
<thead>
<tr>
<th>Group</th>
<th>Sequential order</th>
<th>Pattern repetition</th>
<th>Pictures in context</th>
<th>Classification</th>
<th>Overall %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autistics</td>
<td>25</td>
<td>21</td>
<td>25</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>Controls</td>
<td>33</td>
<td>22</td>
<td>25</td>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>

just one of the four subtests, namely the Sequential Order test (Mann-Whitney: $z = -3.7; p < .0002$). In the other three tasks the difference in performance between the two groups is not significant (Mann–Whitney: $z$ values ranging from $-0.98$ to $-0.04$; $p$ values ranging from $0.32$ to $0.96$).

Table 2 shows the mean scores obtained by the autistics and the controls in the Attention and Memory tasks. In these cognitive tasks the performance of the autistics is poorer than the performance of the controls (Mann–Whitney: $z = -4.7; p < .0001$). This time all four subtests contribute to the overall difference; the performance of the autistics is always significantly worse than the performance of the controls (Mann–Whitney: $z$ values ranging from $-3.09$ to $-4.73; p$ values ranging from $<.002$ to $<.00001$).

Pragmatic Tasks

The overall performance of the autistics in pragmatic tasks does not differ with respect to the overall performance of the controls (Mann–Whitney: $z = -1.36; p = .17$); see Table 3. This result also holds if we consider standard communication (92% of correct responses by the autistics and 87% by the controls; Mann–Whitney: $z = -1.57; p = .12$), nonstandard communication (87% by the autistics and 85% by the controls; Mann–Whitney: $z = -1.16; p = .87$), or the single pragmatic phenomena separately (Mann–Whitney: $z$ values ranging from $-0.21$ to $-1.08; p$ values ranging from $0.29$ to $0.807$). Also, the performances of the two groups do not differ in the pragmatic tasks presented in the wild. Directs and conventional indirects in the wild were the easiest pragmatic tasks to deal with for all participants. In particular, they were equally easy to deal with for both the autistics (100 and 98% of correct responses, respectively) and the controls (98 and 100% of correct responses, respectively).

As regards the expected trends, the difference in difficulty between standard and nonstandard communication is in the predicted direction, but it is not significant for either the autistics (92% versus 87% of correct responses, respectively: Wilcoxon test: $z = -1.7, p = .08$) or the controls (87% versus 85% of correct responses, respec-

TABLE 2
Mean Scores Obtained by Autistics and Controls in the Cognitive Tasks of Attention and Memory

<table>
<thead>
<tr>
<th>Group</th>
<th>Associated pairs</th>
<th>Forward memory</th>
<th>Backward memory</th>
<th>Visual coding</th>
<th>Overall %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autistics</td>
<td>16</td>
<td>17</td>
<td>9</td>
<td>20</td>
<td>47</td>
</tr>
<tr>
<td>Controls</td>
<td>24</td>
<td>21</td>
<td>12</td>
<td>32</td>
<td>65</td>
</tr>
</tbody>
</table>
TABLE 3

Percentages of Correct Responses by Autistics and Controls in the Pragmatic Tasks

<table>
<thead>
<tr>
<th>Group</th>
<th>Directs</th>
<th>Simple indirects</th>
<th>Complex indirects</th>
<th>Ironies</th>
<th>Deceits</th>
<th>Overall %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autistics</td>
<td>95</td>
<td>90</td>
<td>92</td>
<td>88</td>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>Controls</td>
<td>92</td>
<td>88</td>
<td>80</td>
<td>88</td>
<td>82</td>
<td>86</td>
</tr>
</tbody>
</table>

Relatively: Wilcoxon test: \( z = -.05, p = .96 \). Also the trend of difficulty among types of speech acts is in the predicted direction. However, it is significant for the controls (Page’s \( L \) test: \( L = 157, p < .002 \)) but not for the autistics (Page’s \( L \) test: \( L = 150, p = .11 \)). The histogram in Fig. 1 shows the percentages of correct performances by autistics and controls in pragmatic tasks and theory of mind tasks.

Table 4 shows the percentages of correct responses by the autistics and controls in the recovery of failure tasks. Again, there is no significant difference in the overall performances of the two groups (Mann–Whitney: \( z = -0.35; p = 0.73 \)). This result also holds for the different types of recovery of failure, which were considered separately (Mann–Whitney: \( z \) values ranging from 0.000 to \(-0.281\); \( p \) values ranging from \( >0.999\) to \( 0.7787\)).

**Theory of Mind Tasks**

There is a significant difference between the performances of the autistics and the controls in the theory of mind tasks. Surprisingly, the autistics performed significantly better (98% correct responses) than the controls (83% correct responses: Mann–Whitney: \( z = -2.18; p < .03 \)). We attempt to explain this peculiar result below. Also, we discuss the implications of these results in terms of first-order theory of mind tasks.

**Correlations**

As our hypothesis was that FC supports the attentional impairment in both pragmatic and theory of mind tasks, it is meaningless to explore the relation between these kind of tasks and the cognitive tasks, where FC has not been employed. Thus,
we carried out a series of correlations between pragmatic and theory of mind tasks, for both of which the FC was utilized. The predicted positive correlation has been confirmed. In particular, the results show that the performance of the autistics in theory of mind tasks not only correlates with their performance in recovery of failures tasks, but also with the performance in all of the other pragmatic tasks (Spearman correlations: $z$ values ranging from 4.048 to 2.13; $p$ values ranging from $<.0001$ to $<.04$). The same positive correlations hold for the control group (Spearman correlations: $z$ values ranging from 2.694 to 2.060; $p$ values ranging from .0071 to .0394).

Discussion

The aim of our experiment was to analyze the pragmatic competence of mute autistic children. Are they poorer in dealing with pragmatic tasks with respect to a control group of normal children? The data show that the two groups of participants perform equally well in the pragmatic tasks. Also, we expected to detect different difficulties between standard and nonstandard communication and different pragmatic phenomena in both groups. The trends of difficulty—although some are not statistically significant—are confirmed. We suspect that the difference in difficulty among the pragmatic phenomena is not statistically significant because the participants in our experiments are older than the participants in the experiment by Bara and Bucciarelli (1998). Although different pragmatic phenomena may vary in difficulty, children become more expert in dealing with complex phenomena as they grow older. However, the performance of the autistics is surprisingly good.

Results show that our sample of autistic children were better than the control group in dealing with theory of mind tasks. This result is bizarre. Our explanation is that some of the normal subjects underestimated the difficulty of the tasks, and therefore they were not involved enough in producing their responses.

The correlations, consistent with those in the literature, confirm the tight link between recoveries of communicative failures and theory of mind tasks as well as the correlation between the latter and the other pragmatic tasks. These results hold for both groups of participants.

In short, our first experiment shows that autistics perform as well as the control group in pragmatic and theory of mind tasks. Such results can be explained if we hypothesize that the main problem faced by autistics in dealing with such tasks is their attentional deficit, which is consistent with their poor performance in the cognitive tasks. Thus, the methodology provided by FC would overcome autistics’ attentional deficits, and would allow us to access an unexplored world where they communicate and attribute false beliefs to others. The poor performance of the autistics in the literature, in our view, is due to the methodologies classically used to test their pragmatic and theory of mind abilities.

An alternative explanation would be that our sample of autistic children is part of that lucky minority of autistics who are able to deal with theory of mind tasks of the first order (cf. Baron-Cohen et al., 1985) and, as a consequence, with pragmatic tasks.
In order to eliminate this possibility, we carried out a further experiment, on the same population of autistic children, to measure their performances on first- and second-order theory of mind tasks similar to those used in the literature.

**A REPLICATION OF THE CLASSIC THEORY OF MIND EXPERIMENTS ON MUTE AUTISTIC CHILDREN**

In our view, the results of the first experiment suggest that an attentional deficit is responsible for the pragmatic impairment of autistic children as revealed by the classical pragmatic and theory of mind tasks. However, two alternative explanations are still open. First, our autistic children could be considered “high-functioning” autistics. But, because “high-functioning” autistics are defined in terms of their high linguistic abilities, our mute children are by definition excluded from this subset. Second, they could belong to the lucky population of autistic children who, although succeeding in the first-order false belief task, fail in the second-order false belief task. This possibility requires a deeper investigation of the ability of our autistic children to solve second-order theory of mind tasks.

Thus, the aim of our second experiment is to analyze the performance of our sample of autistic children in two theory of mind tasks used in the literature. In particular, one of the tasks measures the ability to deal with first-order representations, as in Experiment 1, and the other measures the ability to deal with second-order representations.

First-order Theory of mind can be measured through the standard false belief tasks. They are sketches acted out by the experimenter, the child, and a third person; the child is invited to attribute a (false) belief to the third person, who is not present at a critical action performed by the experimenter. An example is the Smarties task, in which the experimenter shows the child a tube of Smarties which contains a pencil instead of sweets. Then the experimenter asks the child what the third person will think the tube contains when he or she returns.

Second-order theory of mind is classically measured through tasks that require so-called “recursive thinking” (Miller, Kessel, & Flavell, 1970), i.e., one more level of embedding than that required by first-order theory of mind. In fact, the child has to determine one character’s (false) belief of another character’s belief about the world. An example is Maria erroneously thinking that Giovanni does not know that x.

The tests we used in our second experiment were formerly used by Baron-Cohen (1989b) to show that some of the autistic children who succeeded in the first-order task failed in the second-order task. In particular, in his experiment, all of the 10 experimental subjects who succeeded in the first-order theory of mind task, failed the second-order task. As in our view also the impairment in the ability to solve theory of mind tasks of the second order is due to an attentional deficit, we expect that by FC our autistic children can perform the tasks better than those in the literature. If our autistic children are able to deal with a second-order theory of mind task as well as with a first-order task, then they are not part of a “lucky minority,” but are autistic children who, thanks to FC, can overcome their attentional deficits.

The tests were presented following the classical method (oral narration), except for the questions and the answers. In fact, as our autistic children are mute (contrary to those in the original experiments), they were invited to answer the questions by either writing or pointing to critical locations. Written questions focalize children’s attention on the experimental stimuli in input (story and questions themselves) and on the answers in output.
Methods

Participants. The same participants from the first experiment were used. The experiment was conducted 8 months after the first experiment.

Material and procedures. The experiment was carried out with each participant individually placed in a quiet room in the presence of only the facilitator and the experimenter. The participant was asked to solve the classical theory of mind tasks, in particular, two first-order theory of mind tasks (False Belief and Smarties) and one second-order task. Appendix 2 illustrates the first- and the second-order tasks, together with the questions to be answered by the participants. Each task was preceded by two reasoning problems that functioned as distractors between one task and the other.

The tasks were presented as in the literature, orally, by means of a sketch acted out by the experimenter and the facilitator. The only difference was that each question was presented on either a computer screen or a sheet of paper, and the participant was asked to write down the answer to the questions or to point to a specific location.

With regards to the second-order task, we reproduced the same material as in Baron-Cohen’s experiment: a toy village representing a town scene with four puppets (Maria, Giovanni, Giovanni’s mother, and an ice-cream man). The questions posited to the participant pertained to the following categories:

- **Control questions:** which comprised naming questions (to ensure that the child had not confused the dolls), reality questions (to ensure that the child had knowledge of the real location of the objects), and memory questions (to ensure that the child had a correct memory of the previous locations of the objects).
- **Belief question:** This was the crucial question in that it indicated the level of belief attribution the child was making. The correct answer to this question was the child pointing to or writing “the park.”
- **Justification question:** This allowed us to analyze the quality of the different responses. As Baron-Cohen did in his experiment, we coded the answers to this question into three different categories of belief attribution: zero-order (when neither of the puppet’s beliefs are mentioned), first-order (when the child mentioned only one of the two puppets’ beliefs), and second-order (when the child mentioned both puppets’ beliefs).

Results

The results of the first-order theory of mind tasks showed that all 20 autistic children performed correctly.

With regard to the second-order theory of mind task, 14 of 20 children performed correctly, while 3 failed. The data concerning these remaining 3 children were considered defective; although answering correctly to the belief question, they provided an inconsistent answer to the justification question. The results, given for each type of question, are listed below (see Table 5).

- **Control questions:** All subjects performed correctly on the naming question, the reality question, and the memory question.
- **Belief question:** Two subjects failed the belief question with a consistent justification question. One subject failed the belief question with an inconsistent justification question. These three answers were considered failures.
- **Justification question:** Three subjects failed the justification question, even though they performed correctly on the belief question. We took this data as defective.

To sum up, 100% of the autistic children performed correctly with the first-order

| TABLE 5 | Percentages of Correct Responses by Autistics in Our Study and the Autistics in Baron-Cohen (1989b) to the Different Types of Questions in the Second-Order Theory of Mind Tasks |
|-----------------|-----------------|-----------------|-----------------|
|                 | Control questions | Belief questions | Justification question |
| Autistics in our study (n = 20) | 100 | 85 | 85 |
| Autistics in Baron-Cohen’s study (n = 20) | 95 | 0 | 0 |
theory of mind tasks; in the second-order theory of mind task 85% of autistics performed correctly: they responded correctly to both the belief answer and the justification questions. The difference between the performance in the two tasks is not statistically significant (Wilcoxon test: $z = -1.604$, $p = .11$).

Baron-Cohen’s findings and ours are presented together in Table 5. The mean age of Baron-Cohen’s subjects was 15.3 years; the mean age of our subjects was 11 years. Thus, we rule out the possibility that the improvement of our subjects with respect to those of Baron-Cohen in second-order theory of mind task were due to an increase in age.

**DISCUSSION AND CONCLUSIONS**

The first experiment shows that our sample of autistic children obtained better results than the autistic children in the literature in pragmatic and first-order theory of mind tasks. The goal of the second experiment was to find out whether they are part of the group of autistic children who are able to pass first-order theory of mind tasks but not second-order tasks.

The second experiment shows that our autistic children solve first- and second-order theory of mind tasks equally well. Although some of them failed and some of them gave inconsistent responses in the second-order tasks, we might expect that in a task as complex as this one, normal subjects would also make some errors. The crucial question is: How can we explain such good performances of autistic children in theory of mind tasks and, as a consequence, in pragmatic tasks?

We suggest that FC allows autistics to overcome the attentional deficits that would impair their performance in theory of mind and pragmatic tasks. Indeed, in FC the facilitator’s role is to continuously keep the children’s attention on the task at hand and reduce their stereotyped and compulsive behaviors. Contingent verbal reminders help to continuously focus the attention of the subjects on the task. Moreover, given the attentional impairment of autistic subjects, written stimuli were used in our experiments because they can be processed by the child for as long as needed, and this makes the tasks not vitiated by attentional deficit. To sum up, FC would reduce the working memory and the attentional demands and would allow for the expression of some abilities of autistic children which have never been explored.

Now, let us compare our conclusions with the debate in the literature concerning autism. On the one hand, some authors claim that false belief tasks rely on the ability to metarepresent, which is characteristic of theory of mind. Thus, an impairment of such a mechanism would be at the competence level and would result in the inability to attribute beliefs and desires. From our perspective, this claim is impossible to defend. The autistic subjects of our sample are able to solve both pragmatic and theory of mind tasks, both of which require the ability to attribute mental states. On the other hand, some authors claim that autistic children have attentional deficits, i.e., deficits at a performance level, which would result in impaired performance in pragmatic and theory of mind tasks. From this perspective, our experimental setting has facilitated the autistics’ performance. Indeed, in line with the neurobehavioral theories of autism, our autistic children performed significantly worse than the controls in cognitive tasks measuring memory and attention capacities.

Consistent with our results, Heimann, Nelson, Tjus, and Gillberg (1995) found that interactive and child-initiated multimedia computer programs may increase reading and communication skills in autistic children. These data suggest that the benefit of such methods probably relies on their capacity to focus children’s attention on the task. In particular, Heimann and colleagues noted that computer technology offer
support for several relevant problems in autism: stimulus overselectivity, motivation,
and interactional impairment. The authors attribute the positive changes in communi-
cative development to the increased attention provided by the computer material in
conjunction with the teacher’s active stimulus. Such significant support given by a
teacher does not differ from the facilitator’s function. In both cases a motivating
relationship with a teacher appears to have relevant effects on children’s performance.

We want to emphasize that our findings show that communicative competence in
autistic children is intact. It is certainly true that, under normal conditions, communi-
cative performance in autistics is blatantly disrupted; but once attentional and emo-
tional support is offered, performance is restored. Our results contradict the hypothe-
sis of a lack of communicative competence in autistics; it remains to be seen why
competence does not emerge in autistic development.

One final note: One of the authors (L.C.) trained to become a facilitator and has
shared her impressions with the other authors. One such impression is that to an
autistic child, being in a “normal” environment is equivalent to a normal child being
in a lion’s cage. In either case both are too terrified to exhibit their capabilities.
The facilitator reduces fear: under such conditions, if competence is not disrupted,
performance will be much improved. The answer provided by one of our autistic
participants to question 4 in Experiment 1 (see Appendix 1) is consistent with our
conclusion. To the question “Do you think you would mind if somebody entered
the room?” he answered, “Yes, we always live in fear.”

APPENDIX 1

Pragmatic and Theory of Mind Tasks Used in Experiment 1

All were presented in written form.

Directs in Action

(1) What’s your mother’s name?
(2) How old are you?
(3) Do you go to school?

Simple Indirects in Action

(4) Do you think you would mind if somebody entered the room?
(5) Do you mind if I open the window?
(6) Could you tell me your teacher’s name?

Directs

(7) Aldo meets his new neighbour and says: “Nice to meet you, my name is Aldo.”
   Why does Aldo say that?
(8) Alex has an appointment in twenty minutes with his football team. He goes
to his mother and says: “Where are my football shoes?”
   Why does Alex say that?
(9) Gigi has just finished painting the kitchen chairs when Greta enters. Then Gigi
   immediately says: “Be careful where you sit down!”
   Why does Gigi say that?
Simple Indirects

(10) Sergio goes to the cinema and finds Edo. Sergio says hello to Edo, and says: “Do you mind if I sit down near you?”
Why does Sergio say that?
(11) The teacher says hello to the new child and says: “Do you want to tell me your name?”
Why does the teacher say that?
(12) Vale and Rita are playing together in the garden. Vale says to Rita: “Would you lend me your bicycle?”
Why does Vale say that?

Complex Indirects

(13) Andrea and his mother are in the living-room. His mother is sewing and Andrea is playing. He says: “Mom, I want some chocolate.” His mother replies: “You have had too much.”
What does his mother mean to say?
(14) Luca has just finished doing his homework. He goes to his mother and says: “Mom, I’ve finished my homework. Are we going out to play?” His mother looks out of the window and says: “It’s raining.”
What does she mean to say?
(15) Cinzia and Paola meet in the street. Cinzia says: “Hi Paola, it’s a long time since we met. Are you coming to the cinema with me?” Paola replies: “I must finish my homework.”
What does Paola mean to say?

Ironies

(16) Enzo is building a tower out of lego. His mother puts a little brick on the top and the tower falls down. Then Enzo says: “You gave me a real help!”
What does Enzo want to say?
(17) Marco and his father are eating sweets. At a certain point Marco says: “Dad, this is the last sweet.” The father says: “Will you give it to me?” Marco takes the last sweet, eats it and he only gives his father the wrapping. The father says: “Thanks, that’s very kind of you.”
What does the father want to say?
(18) Fabio is eating an ice-cream and he soils his T-shirt. Arrives Adele who looks at him and says: “What a clean T-shirt!”
What does Adele mean to say?

Deceits

(19) Gianni and Cinzia are chasing each other around the school-class. Accidentally, Cinzia breaks a vase of flowers. The teacher arrives and asks angrily: “Who did that?” Cinzia says: “Gianni.”
Why did Cinzia say that?
(20) Elisa and Marta are playing hide and seek. Fabio is near them and he is reading a comic. Elisa counts and Marta hides in the wardrobe. Then Elisa turns round and asks Fabio in the whisper: “Where is Marta?” Fabio replies: “Behind the curtain.”
Why did Fabio say that?
(21) Anna is eating some biscuits. Suddenly she hears somebody knocking at the door. She hides the biscuits and says: “Come in!” Silvia enters and says: “Hi Anna.
I would like something sweet. Have you got any biscuits?’’ Anna says looking sorry: ‘‘No, I haven’t.’’

Why did Anna say that?

Recovery of Failures: Simple Speech Act

(22) Two school mates, Giorgio and Sandro, are writing a composition. At a certain point, Giorgio’s pen stops working. So, Giorgio asks Sandro: ‘‘Would you lend me a pen?’’ Sandro says: ‘‘No.’’

Then Giorgio, to induce Sandro to lend him a pen, says: *(the child is invited to complete the sentence)*

Recovery of Failures: Complex Speech Act

(23) Sonia is using a hammer to drive some nails into the wall of her room and attach some paintings. Alice arrives and says: ‘‘I’m not able to study because it is too noisy.’’ Then Alice goes back to her room, and Sonia take a drill to make the holes in the wall.

Then, Alice, who wants to study quietly, goes back to Sonia and says: *(the child is invited to complete the sentence)*

Recovery of Failures: Deceit

(24) One day a shepherd encounters a gentleman who says: ‘‘Good morning, dear boy. Do you know where the nearest pasture land is? I’m hungry and I would like to eat a sheep.’’ The frightened shepherd says: ‘‘I’m sorry sir. I’m not from here. I am a postman.’’ The sir is saying goodbye to him when a lady comes down the road and says: ‘‘Good morning, shepherd. I’ve just seen your sheep. What a lot there are!’’

So the shepherd makes the gentleman understand he didn’t lie by saying: *(the child is invited to complete the sentence)*

First-Order Theory of Mind Tasks

(25) Claudio and Mario are playing with a football. But Claudio must go to visit his grandmother. Thus, he leaves Mario and the ball in the room and goes away. Mario is now alone. He tidies the room. But, instead of leaving the ball in the wardrobe, as usual, he decides to take the ball into his room.

When Claudio comes back, where do you think he will look for the ball?

(26) Silvio is reading a Mickey Mouse comic when the interphone rings. It’s his cousin who invites him out for an ice-cream. Silvio puts the Mickey Mouse comic in his school-bag, and goes out with his cousin. Later, his brother Luigi puts his nose into Silvio’s school-bag. He finds the Mickey Mouse comic and takes it to his room.

When Silvio comes back, where will he look for the Mickey Mouse comic?

(27) Pippo and Susanna have a meeting for 9 AM. Susanna is looking for him to postpone the appointment to 11 AM. But she doesn’t succeed.

At what time will Pippo go to the appointment?

APPENDIX 2

Theory of Mind Tasks Used in Experiment 2

All were presented orally, as in the classic experiments. The only difference is that each question was presented on either a computer screen or a sheet of paper, and the participant is invited to write down the answer or to point to a specific location.
First-Order Theory of Mind Tasks

False Belief Task: Livia (the experimenter) and the child observe the facilitator while hiding some chocolate in a drawer. Livia goes out of the room, and the facilitator hides the chocolate in another place. Then the facilitator presents the child with the following question:

``Where will Livia look for the chocolate when she comes back?''

Smarties: The facilitator is in the room, alone with the child. The facilitator shows the child a typical container—a tube of Smarties—and then asks the child what the tube contains. The child replies ‘‘Smarties.’’ The facilitator opens the tube and shows the child some pens. Then, the facilitator presents the child with the following question:

What will Livia (who was not there) think there is in the tube?

Second-Order Theory of Mind Task

The experimenter lays out the toy village on the table in front of the child. First the child is asked to name all the toys (which all our participants could do easily). The experimenter then tells the following story, moving the characters (dolls) and the ice-cream van accordingly:

This is Giovanni and this is Maria. They live in this village.

Naming question: Which is Giovanni/Maria?

Here they are in the park. Along comes the ice-cream man. Giovanni would like to buy an ice-cream but he has left his money at home. He is very sad. ‘‘Don’t worry’’ says the ice-cream man, ‘‘you can go home and get your money and buy some ice-cream later. I’ll be here in the park all afternoon.’’ ‘‘Oh good,’’ says Giovanni. ‘‘I’ll be back in the afternoon to buy an ice-cream.’’

Prompt question [1]: Where did the ice-cream man say to Giovanni he would be all afternoon?

So Giovanni goes home. He lives in this house. Now, the ice-cream man says, ‘‘I am going to drive my van to the church to see if I can sell my ice-creams outside there.’’

Prompt question [2]: Where did the ice-cream man say he was going?
Prompt question [3]: Did Giovanni hear that?

The ice-cream man drives over to the church. On his way he passes Giovanni’s house. Giovanni sees him and says ‘‘Where are you going?’’ The ice-cream man says, ‘‘I’m going to sell some ice-cream outside the church.’’ So off he drives to the church.

Prompt question [4]: Where did the ice-cream man tell Giovanni he was going?
Prompt question [5]: Does Maria know that the ice-cream man has talked to Giovanni?

Now Maria goes home. She lives in this house. Then she goes to Giovanni’s house. She knocks on the door and says ‘‘Is Giovanni in?’’ ‘‘No,’’ says his mother, ‘‘he’s gone out to buy an ice-cream.’’

Belief question: Where does Maria think Giovanni has gone to buy an ice-cream?
Justification question: Why?
Reality question: Where did Giovanni really go to buy his ice-cream?
Memory question: Where was the ice-cream man in the beginning?

REFERENCES


